REMARKS/ARGUMENTS

Claims 3-9, 19, and 27-32 are pending in this application. By this Amendment, Applicant AMENDS claims 3 and 4.

Applicant's undersigned representative appreciates the Examiner extending the courtesy of the personal interview on May 18, 2010. During the personal interview, Applicant's undersigned representative and the Examiner discussed how claims 3 and 4 could be clarified to overcome the 35 U.S.C. § 112, first and second paragraph, rejections in the outstanding Office Action dated April 15, 2010. As explained in further detail below, Applicant has amended claims 3 and 4 in accordance with the Examiner's suggestions during the personal interview in order to overcome the rejections of claims 3-9, 19, and 27-32 under 35 U.S.C. § 112, first and second paragraph.

Claims 3-9, 19, and 27-32 were rejected under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement. Claims 3-9, 19, and 27-32 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

With respect to the Examiner's allegation 1) that there is no description in the specification of the algorithm or relationship between the methanol (fuel) aqueous solution and the fuel cell stack temperature to enable the "input amount determining device" to perform its claimed functions, the Examiner is referred to, for example, paragraphs [0009], [0078], [0083], [0103], and [0107] of Applicant's substitute specification filed October 4, 2006 and Fig. 3 of Applicant's drawings. In particular, Fig. 3 of Applicant's drawings clearly show the relationship between the fuel cell stack temperature and the target concentration of the fuel aqueous solution S for various ranges of the fuel cell stack temperature, and paragraph [0107] of Applicant's substitute specification describes how methanol fuel F is added to the fuel aqueous solution tank to achieve a target concentration of the fuel aqueous solution S based on the known quantity of fuel aqueous solution S in the tank and the known concentration of methanol fuel F in the fuel aqueous solution S. Applicant respectfully submits that the precise

amount of methanol fuel F to be added to the fuel aqueous solution S to achieve a specific target concentration of fuel in the fuel aqueous solution S would have been readily apparent to one of ordinary skill in the art.

With respect to the Examiner's allegation 2) that there is no description of how the algorithm shown in Fig. 10 of Applicant's drawings is related to the input amount determining device, the Examiner is referred to paragraphs [0118] through [0121] of Applicant's substitute specification which clearly describe how methanol fuel F is added to the fuel aqueous solution S *after* power generation is finished to increase the concentration of the fuel aqueous solution S in preparation for the next power generation, thereby accelerating power generation. Again, Applicant respectfully submits that the precise amount of methanol fuel F to be added to the fuel aqueous solution S to achieve a specific target concentration of fuel in the fuel aqueous solution S would have been readily apparent to one of ordinary skill in the art.

With respect to the Examiner's allegation 3) that there is no description of whether the "target temperature raise time setting device" works the same as the "target concentration determining device," or how these two devices are related, the Examiner is referred to, for example, paragraphs [0010], [0078], [0079], and [0104] of Applicant's substitute specification and Figs. 4(a) and 4(b) of Applicant's drawings, which clearly describe and show how, if the factor of target temperature raise time is also to be considered, the target concentration of methanol fuel F in the fuel aqueous solution S is further adjusted. That is, the target concentration calculated by the "target concentration determining device" is simply increased to decrease the target temperature raise time. Since the table data shown Fig. 4(a) of Applicant's drawings describes the relationship between fuel cell stack temperature, target concentration, and target temperature raise time, Applicant respectfully submits that the precise amount of methanol fuel F to be added to the fuel aqueous solution S to achieve a specific target concentration of fuel in the fuel aqueous solution S would have been readily apparent to one of ordinary skill in the art.

With respect to the Examiner's allegation 4) that there is no enabling description

of the relationship between the different target concentration determining functions "i.e. the relationship of between a target concentration determining device based on the memory data and the fuel cell stack temperature (relationship shown in Fig 3) and concentration determining based on the fuel cell stack temperature and raise time," Applicant respectfully submits that paragraphs [0010], [0078], [0079], and [0104] of Applicant's substitute specification and Figs. 4(a) and 4(b) of Applicant's drawings, as described above, clearly describe and show how, if the factor of target temperature raise time is also to be considered, the target concentration of methanol fuel F in the fuel aqueous solution S is further adjusted depending on the desired target temperature raise time.

With respect to the Examiner's allegation 5) that there is no description of how the function of the "target concentration determining device" based on fuel cell stack temperature and the amount of electric charge in the secondary battery is related to the target concentration determining device based solely on target concentration, the Examiner is referred to, for example, paragraphs [0011], [0012], [0078], [0080], and [0105] through [0110] of Applicant's substitute specification and Figs. 5(a), 5(b), 5(c), and 6(b) of Applicant's drawings, which clearly describe and show how, if the factor of amount of electric charge in secondary battery is also to be considered, the target temperature raise time and the target concentration can be further adjusted based on fuel cell stack temperature. In particular, as described in paragraphs [0108] through [0110] of Applicant's substitute specification, there are different modes for determining target concentration depending on which factors are to be considered. Applicant respectfully submits that Figs. 5(a), 5(b), 5(c), and 6(b) of Applicant's drawings clearly show how the amount of charge in the secondary battery affects, or is affected by, the factors of target temperature raise time, fuel cell stack temperature, and target concentration.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 3-9, 19, and 27-32 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the enablement requirement, and under 35 U.S.C. § 112,

second paragraph, as allegedly failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Claims 3-9, 19, and 27-32 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. The Examiner alleged that the claimed apparatus is coupled with functional language instead of "means for, steps for performing a specified function without the recital of structure, material, or acts in support thereof (i.e. proper 112 6th paragraph language)." As discussed during the personal interview on May 18, 2010, Applicant has amended the claims to recite the necessary structure to perform the claimed functions and informed the Examiner that Applicant's claims do not recite any "means for" language, and thus none of the recitations in Applicant's claims invoke 35 U.S.C. § 112, sixth paragraph. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 3-9, 19, and 27-32 under 35 U.S.C. § 112, second paragraph.

Claims 3-9, 19, and 27-32 were rejected under 35 U.S.C. § 112, second paragraph, as allegedly being incomplete for omitting essential elements. As agreed to during the personal interview on May 18, 2010, Applicant has amended claims 3 and 4 to recite a central processing unit (CPU) to perform the claimed functions. Support for the amendments to claim 3 can be found, for example, in paragraphs [0073], [0078], [0079], [0083], and [0104] in Applicant's specification and Figs. 4(a) and 4(b) of Applicant's drawings. Support for the amendments to claim 4 can be found, for example, in paragraphs [0073], [0078], [0080], [0083], and [0105] through [0110] of Applicant's substitute specification and Figs. 5(a), 5(b), 5(c), and 6(b) of Applicant's drawings.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 3-9, 19, and 27-32 under 35 U.S.C. § 112, second paragraph.

Claims 3-9, 19, and 27-32 were provisionally rejected under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 11-17 of co-pending U.S. Application No. 11/814,616.

Since the present application has an earlier filing date than U.S. Application No. 11/816,616, Applicant respectfully submits that the provisional rejection should be withdrawn and the application allowed to issue without a terminal disclaimer. See M.P.E.P. § 804(I)(B)(1). Furthermore, the Examiner has failed to show where claims 11-17 of co-pending U.S. Application No. 11/814,616 recite each and every element recited in Applicant's claims 3 and 4, or why any missing elements recited in Applicant's claims 3 and 4 would have been obvious to one of ordinary skill in the art.

Accordingly, Applicant requests reconsideration and withdrawal of the provisional rejection of claims 3-9, 19, and 27-32 under the judicially created doctrine of double patenting as being unpatentable over claims 11-17 of co-pending U.S. Application No. 11/814,616.

Claims 3-9, 19, and 27-32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Christen et al. (U.S. 2002/0025465) in view of Gopal et al. (U.S. 2004/0054483) and Ichikawa et al. (U.S. 2003/0180583) (Applicant notes that the Examiner only listed claims 3 and 4 in the introductory sentence of the rejection, although mentioned claims 5-9, 19, and 27-32 in the body of the rejection).

Applicant respectfully traverses the rejections of claims 3-9, 19, and 27-32.

Claim 3 has been amended to recite:

> A fuel cell system comprising:
> a fuel cell stack which is supplied with a fuel aqueous solution and generates electric energy by electro-chemical reaction;
> a concentration detector arranged to detect a concentration of the fuel aqueous solution to be supplied to the fuel cell stack;
> a temperature detector arranged to detect a temperature of the fuel cell stack;
> a central processing unit programmed to control the fuel cell system;
> a memory arranged to store data including first correspondence data which indicates a correspondence between the temperature of the fuel cell stack and a target concentration of the fuel aqueous solution;
> the central processing unit and the memory together defining an input amount determining device programmed to determine an amount of fuel to be inputted to the fuel aqueous solution based on the concentration of the fuel aqueous solution detected by the concentration detector and the temperature of the fuel cell stack detected by the temperature detector; and

an input device arranged to input the determined amount of the fuel to the fuel aqueous solution; wherein

the central processing unit further includes:

a target concentration determining device programmed to determine a target concentration of the fuel aqueous solution by making reference to the first correspondence data in the memory and based on the temperature of the fuel cell stack detected by the temperature detector;

an input fuel amount determining device programmed to determine an amount of fuel to be input based on the concentration of the fuel aqueous solution detected by the concentration detector and the target concentration determined by the target concentration determining device; and

a target temperature raise time setting device programmed to set a target temperature raise time which indicates a time that is necessary for increasing the fuel cell stack to a predetermined temperature; wherein

the data in the memory further includes second correspondence data which indicates a correspondence between the temperature of the fuel cell stack, the target temperature raise time, and the target concentration; and

the target concentration determining device determines the target concentration of the fuel aqueous solution by making reference to the second correspondence data and based on the temperature of the fuel cell stack detected by the temperature detector and the target temperature raise time set by the target temperature raise time setting device. (emphasis added)

With respect to claim 3, the Examiner acknowledged that neither of Christen et al. and Gopal et al. teaches a temperature raise time setting device, but alleged that Ichikawa et al. teaches a clock (claim 11 of Ichikawa et al.) and that it is necessary to increase the fuel cell temperature of Ichikawa et al. to a predetermined temperature during fuel cell activation "where in a temperature raise timer is expected" in the fuel cell system of Ichikawa et al. The Examiner further alleged that it would have been obvious to provide the fuel cell system of Christen et al., as modified by Gopal et al., with a clock "to modify the fuel cell system because such elements can help manipulating prevent [*sic*] unnecessary power consumption during fuel cell activation."

Applicant respectfully disagrees that Ichikawa et al. cures the deficiencies of Christen et al. and Gopal et al. for the following reasons.

The clock 57B of Ichikawa et al. stores operation time of a vehicle having the fuel cell mounted thereon in order to determine whether or not a trip by the vehicle will be a

short trip, wherein the vehicle can run solely on the electric charge in a battery and the fuel cell does not need to be activated, or a long trip, wherein the fuel cell must be activated. See, for example, paragraph [0082] of Ichikawa et al. which teaches:

> For example, learning control can be used to store a date/time running pattern comprising any one of a calendar 57A, a clock 57B, a GPS 57C (see in FIG. 1) or a combination thereof. Thus it is possible to determine either short-term operation running mode or normal running mode according to the stored date/time running pattern. **The date/time running pattern is a running pattern specific to the driver determined on the date, day of the week or time period**. **For example, when the fuel cell vehicle is used for delivering goods, in a weekday time period, it is clearly the case that the vehicle will frequently operate in a short-term operation running mode due to performing deliveries to high-density housing areas**. In this case, learning control stores short-term operation running mode as the mode for the delivery time period. (emphasis added)

Thus, the clock 57B of Ichikawa et al. has absolutely nothing to do with setting a target temperature raise time which indicates a time that is necessary for increasing a temperature of the fuel cell to a predetermined temperature, and Ichikawa et al. certainly does not teach or suggest that the target concentration is determined by reference to the temperature of the fuel cell, the target temperature raise time, or a target concentration.

Thus, the combination of Christen et al., Gopal et al., and Ichikawa et al. clearly fails to teach or suggest the features of "a target temperature raise time setting device programmed to set a target temperature raise time which indicates a time that is necessary for increasing the fuel cell stack to a predetermined temperature," "the data in the memory further includes second correspondence data which indicates a correspondence between the temperature of the fuel cell stack, the target temperature raise time, and the target concentration," and "the target concentration determining device determines the target concentration of the fuel aqueous solution by making reference to the second correspondence data and based on the temperature of the fuel cell stack detected by the temperature detector and the target temperature raise time

set by the target temperature raise time setting device," as recited in Applicant's claim 3.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 3 under 35 U.S.C. § 103(a) as being unpatentable over Christen et al. in view of Gopal et al. and Ichikawa et al.

Claim 4 has been amended to recite:

> A fuel cell system comprising:
> a fuel cell stack which is supplied with a fuel aqueous solution and generates electric energy by electro-chemical reaction;
> a concentration detector arranged to detect a concentration of the fuel aqueous solution to be supplied to the fuel cell stack;
> a temperature detector arranged to detect a temperature of the fuel cell stack;
> a central processing unit programmed to control the fuel cell system;
> a memory arranged to store data including first correspondence data which indicates a correspondence between the temperature of the fuel cell stack and a target concentration of the fuel aqueous solution;
> the central processing unit and the memory together defining an input amount determining device programmed to determine an amount of fuel to be inputted to the fuel aqueous solution based on the concentration of the fuel aqueous solution detected by the concentration detector and the temperature of the fuel cell stack detected by the temperature detector;
> an input device arranged to input the determined amount of the fuel to the fuel aqueous solution; and
> **a secondary battery electrically connected with the fuel cell stack, and an electric-charge detector arranged to detect an amount of electric charge in the secondary battery**; wherein
> the central processing unit further includes:
> a target concentration determining device programmed to determine a target concentration of the fuel aqueous solution by making reference to the first correspondence data in the memory and based on the temperature of the fuel cell stack detected by the temperature detector; and
> an input fuel amount determining device programmed to determine an amount of fuel to be input based on the concentration of the fuel aqueous solution detected by the concentration detector and the target concentration determined by the target concentration determining device; wherein
> **the data in the memory includes second correspondence data which indicates a correspondence between the temperature of the fuel cell stack, the amount of electric charge in the secondary battery, and the target concentration**; and
> **the target concentration determining device determines the target concentration of the fuel aqueous solution by making reference to the**

> **second correspondence data and based on the temperature of the fuel cell stack detected by the temperature detector and the amount of electric charge in the secondary battery detected by the electric-charge detector**. (emphasis added)

With respect to claim 4, the Examiner acknowledged that neither of Christen et al. and Gopal et al. teaches a secondary battery and detecting a charge of the secondary battery, but alleged that Ichikawa et al. teaches a battery connected to the fuel cell, a sensor for detecting the state of charge (SOC) of the battery (claim 13 of Ichikawa et al.), and a controller 33 which estimates the energy required to activate the fuel cell based on battery residual charge. The Examiner further alleged that it would have been obvious to provide the fuel cell system of Christen et al., as modified by Gopal et al., with a secondary battery and electric charge detectors "to modify the fuel cell system because such elements can help manipulating prevent [*sic*] unnecessary power consumption during fuel cell activation."

Applicant respectfully disagrees that Ichikawa et al. cures the deficiencies of Christen et al. and Gopal et al. for the following reasons.

Ichikawa et al. teaches detecting a charge in the secondary battery primarily to determine if the battery can supplement the energy provided by the fuel cell (see, for example, paragraph [0031] of Ichikawa et al.) and whether or not the fuel cell should be activated so as not to unnecessarily consume electric power from the battery (see, for example, paragraphs [0037] and [0038] of Ichikawa et al.). Although Ichikawa et al. teaches that the energy required to activate the fuel cell is affected by temperature (see, for example, Fig. 3 of Ichikawa et al.), Ichikawa et al. does not remotely teach or suggest determining a target concentration of the fuel aqueous solution based on the temperature of the fuel cell or the amount of electric charge of the battery. In fact, Ichikawa et al. does not teach or suggest anything at all about the concentration, let alone the target concentration, of the aqueous fuel solution in the fuel cell.

Thus, the combination of Christen et al., Gopal et al., and Ichikawa et al. clearly fails to teach or suggest the features of "a secondary battery electrically connected with

the fuel cell stack, and an electric-charge detector arranged to detect an amount of electric charge in the secondary battery," "the data in the memory includes second correspondence data which indicates a correspondence between the temperature of the fuel cell stack, the amount of electric charge in the secondary battery, and the target concentration," and "the target concentration determining device determines the target concentration of the fuel aqueous solution by making reference to the second correspondence data and based on the temperature of the fuel cell stack detected by the temperature detector and the amount of electric charge in the secondary battery detected by the electric-charge detector," as recited in Applicant's claim 4.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Christen et al. in view of Gopal et al. and Ichikawa et al.

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 3 and 4 are allowable. Claims 5-9, 19, and 27-32 depend upon claims 3 and 4, and are therefore allowable for at least the reasons that claims 3 and 4 are allowable.

In view of the foregoing amendments and remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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